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SUBJECT 1. Experimental Scientific Research Institute for Metal-cutting Machine Tools (ENIMS)
2. Stankokonstruktsiya Machine Tool Factory

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SUPPLEMENT TO REPORT NO.

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I. Experimental Scientific Research Institute for Metal-cutting Machine Tools

Identification

1. The Experimental Scientific Research Institute for Metal-cutting Machine Tools (Eksperimentalny Nauchno-Issledovatelski Institut Metallorezhushchikh Stankov or ENIMS (formerly ENIIMS)) is located in Moscow, Leninski Raion, 21a 5-i Donskoi Proezd, next door to its experimental factory Stankokonstruktsiya (21b, 5-i Donskoi Proezd) and another large machine tool factory Imeni Ordzhonikidze (21, 5-i Donskoi Proezd). Not far away is the Krasny Proletari Machine Tool Factory (15 Malaya Kaluzhskaya).

History

2. ENIMS was founded in 1933 by the amalgamation of the Scientific Research Institute for Machine Tools and Tools (NIISTI) and the Central Design Bureau of the Machine Tool Association (TsKB). About 1930, a fairly large number of machine tool factories started operating in the USSR and factories of other branches of industry also started producing machine tools. This development created a great need for a scientific center capable of providing proper technical guidance in machine tool construction. ENIMS was founded to meet this need.

3. During the first years of its existence, ENIMS carried out tasks of a purely practical and engineering nature, such as the study of foreign machine tools and the selection of types and designs of machine tools for production. Gradually, special bureaus and laboratories were organized and, in 1934, the Institute established its own experimental factory, Stankokonstruktsiya, for the production of experimental machine tools designed by the Institute. Experienced cadres of designers and specialist engineers were also gradually formed.

4. Before the war, ENIMS already had eight laboratories (Engineering, Thermic, Metallographic, Chemical, X-Ray, Welding, Control and Measuring, Cutting) and several bureaus (Types, Normalization and Standardization, Gear-cutting Work, Aggregate Machine Tools, Automatic Machine Tools, Guiding Material and Technical Information, etc.) besides the Stankokonstruktsiya experimental factory.

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5. Each of these bureaus worked in its own speciality. Following are some examples:

   a. The Bureau for Types assisted the Machine Tool Industry Directorate in working out questions concerning the specialization of production at machine tool factories, in establishing types of machine tools for production, etc.

   b. The Bureau for Gear-cutting Work conducted research on the production of gear-wheels, on types of gear-machining machine tools and gear-cutting tools, and on many other matters (finishing of gears, grinding, shaving process, etc.).

   c. The Bureau for Normalization and Standardization worked out standard specifications for machine tool units (pumps, hydraulic and electric appliances, etc.), for machine tool devices, accessories cutting tools, etc., and prepared material for publication of State Standards for machine tool construction. For example, this bureau worked out standards for a number of powers of electric motors employed in machine tool construction (60 type-sizes).

   d. The Bureaus for Aggregate Machine Tools, Universal Machine Tools, and Automatic Machine Tools were engaged in designing machine tools according to their specialities.

6. Before the war, ENIMS had already published a number of theoretical works on questions of machine tool construction, notably those of Professor D.N. Reshetov (e.g. "Research on Machine Tool Bearings", "Sliding and Rolling", "Calculation of Machine Tools ", etc.); Professor A.I. Kashirin (e.g. "Technology of Machine Tool Construction", "Testing of Surface", etc.); Professor N.S. Acherkan; Professor G.A. Shaumyan; Professor B.I. Boguslavski, and others.

Work of ENIMS Before the War

7. In 1939, ENIMS, by order of the Government, began to design special types of machine tools in the following order of priority:

   a. for the artillery industry

   b. for the aircraft-engine industry

   c. for the munitions industry

   d. for the small arms industry

   e. for railway transport

   f. for the ferrous metal industry

   g. for the shipbuilding industry

   h. for the motor tractor industry

8. In 1941, ENIMS and its factory were evacuated to Sverdlovsk, where work was at once resumed on designing machine tools for the defense industry. A munitions factory was organized on the premises of the Stankokonstruktsiya factory in Moscow with the aid of part of the personnel and equipment left behind. Two years later ENIMS and its factory returned to Moscow.

9. It is very difficult to describe all the varied activities of ENIMS and its bureaus and laboratories during the war. The development of ENIMS at that time continued at an increased rate. Before the war, ENIMS had only 8 laboratories and in 1944 there were 13.

10. Particularly important was the work of the Central Design Bureau for Aggregate Machine Tools (Tsentralnoye Konstruktorskoye Byuro Aggregatnykh Stankov, abbreviated TsKBAS) under its Chief Designer Yu. B. Erpsher, who worked under the direction of V.U. Dikushin*, Chief Designer of ENIMS. Most of the machine tools designed during the war at this bureau were special aggregate machine tools. Before the war, this bureau designed a great number of aggregate machine tools for the motor vehicle and tractor industries, for the ZIS, GAZ, STZ, KhTZ factories, for the Moscow underground railway, and for other enterprises.

11. In November 1941, only two months after arrival at its new location, ENIMS had completed the already designed aggregate machine tools for the production of heavy tanks KV and T-34. In March 1942, the Stankokonstruktsiya factory at Sverdlovsk constructed the first semi-automatic line of machine tools for the treatment of a part of the KV tank. This was a line of drilling and boring machine tools for the treatment of the side plate (bortovoi list) of the tank (each part weight about 5 tons). A type of roller conveyer was installed for the transport of the parts.

12. In 1942, two lines of multiple-spindle aggregate machine tools for the treatment of still larger parts (tank bodies) were installed. Up to 100 operations were carried out simultaneously on this line. Special roll-over platforms were employed for transport. The mass production of tanks was made possible thanks to these lines and aggregate machine tools.

13. In the middle of 1943, various aviation factories were using about 80 special aggregate machine tools of various types built according to ENIMS designs in the course of two and a half years. These 80 machines replaced about 900 universal machine tools and effected great economy in manpower (about 1600 workers, on the basis of two shifts, since during the war work was conducted in two shifts of 12 hours each).

14. From June 1941 to June 1944, ENIMS designed about 900 different types of machine tools, some of them of original design but most of them modifications of foreign machine tools. During this period the Stankokonstruktsiya factory built about 800 machine tools, mostly of special aggregate type.

15. After the war, for the successful designing and production of new aggregate machine tools for the aviation, tank, and other branches of the defense industry, the following group of workers of ENIMS was awarded Stalin Prizes:

I.F. Maslennikov - director of ENIMS and Stankokonstruktsiya factory (now head of the Chief Directorate for Aggregate and Special Machine Tools of the Ministry for Machine Tool Construction of the USSR)

Engineer Yu. B. Erpsher - chief designer of TsKBAS (now chief designer of Special Design Bureau No. 1 /SKB-1/ of the Ministry for Machine Tool Construction of USSR)

Engineer Volchek - deputy chief designer of TsKBAS

Engineer A.L. Kuptsov - head and chief designer of the Bureau for Universal Machine Tools of ENIMS

Engineer G.I. Zuzanov - head of the assembly shop of the Stankokonstruktsiya factory (now designer of SKB-1)

Engineer A.A. Levin - senior designer of TsKBAS

Engineer S.B. Filatovich - senior designer of TsKBAS (killed by a German bomb in 1943).

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Engineer V.I. Didushin - still chief designer of ENIMS and now a corresponding member of the Academy of Sciences, professor, and Doctor of Technical Sciences.

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Engineer I.E. Burshtein - head of the Tool and Cutting Laboratory (still holds this post)

Senior Engineer K.P. Stayev of the Tool and Cutting Laboratory (still holds this post)

Engineer G.A. Afraimovich - deputy head of Tool and Cutting Laboratory (still holds this post)

ENIMS after the War

16. The development of ENIMS has continued since the war. It has been reorganized; the number of laboratories has gradually increased and reached 18 [redacted] 50X1-HUM

17. The Central Design Bureau for Aggregate Machine Tools (TsKBAS) has been reorganized into the Special Design Bureau (SKB) of the Ministry for Machine Tool Construction of the USSR, under direct control of the head of the Chief Directorate for Aggregate and Special Machine Tools of the Ministry. The head of this Directorate is I.F. Maslennikov, Stalin Prize Laureate and director of ENIMS during the war.

18. The Stankokonstruktsiya Factory has become more independent of ENIMS. From the foundation of ENIMS until after the war, the director of the factory was also the director of ENIMS. Since the war, each establishment has had its own director. At present the director of ENIMS is A.F. Vladziyevski, Candidate of Technical Sciences, and the director of Stankokonstruktsiya Factory is M.M. Chuyan (formerly for a long time in charge of a shop at the Krasny Proletari Factory).

Laboratories

19. ENIMS now has the following 18 laboratories:

a. Tool and Cutting Laboratory (Laboratoriya Instrumenta i Rezaniya)

b. Mechanical Laboratory

c. Thermic Laboratory

d. Chemical Laboratory

e. X-Ray Laboratory

f. Welding Laboratory

g. Laboratory for Optical Study of Stresses

h. Control and Measuring Laboratory

i. Laboratory for Machine Tool Testing

j. Laboratory for Metals

k. Laboratory for Treatment of Plane Surfaces (Obrabotka Ploskostei)

l. Laboratory for Automatic Lathe Work (Tokarno-Avtomatniye Raboty)

m. Laboratory for Electrification of Machine Tools

n. Laboratory for Hydraulic Driving Gears (Gidroprivody)

l. Laboratory for Grinding and Finishing Work

p. Laboratory for Testing of Surfaces (Kachestvo Poverkhnostei)

q. Laboratory for Architecture and Modelling of Machine Tools

r. Laboratory for Testing Experimental Models in connection with the Planning of Standards and Departmental Norms. (Ispytaniye Opytnykh Obraztsov Pri Proyektirovani Standartov i Vedomstvennykh Normalei)

Details of Some of the Laboratories and Bureaus

20. The Laboratory for Metals works out standards for the following selections of materials for machine tool parts, depending on the conditions of their work: steels of various kinds, grey iron, modified pig iron (with silico-calcium, ferro-silicon, etc.), anti-friction alloys, bronzes, babbitts; artificial aging of iron castings and mounts (Stanina) by thermic treatment; thermic treatment of machine tool parts; chemical and thermic treatment: nitration, liquid carbonization (Tsementatsiya) with the addition of carborundum; casehardening of guide mounts of machine tools with induction heating by high-frequency currents; diffusion chrome-plating; borating (Borirovaniye) of steel, etc.

Personnel in this laboratory includes: E.S. Kagan, E.D. Spivak, F.R. Florensova, E.M. Morozova, and others.

21. The Tool and Cutting Laboratory works out standards of methods (Rezhim) for drilling, counter-sinking, reaming, gear-cutting, broaching, etc., work out design of tools, cutting with hard alloys, and new methods of producing tools.

Personnel in this laboratory includes I.E. Burshtein, engineer, head of the laboratory; engineer K.P. Stayev; G.A. Afraimovich, deputy head of laboratory, and others. Engineers Burshtein and Stayev were awarded Stalin Prizes for working out a method of knurling threads on screw taps on special thread-knurling machine tools types 5962 and 5964 (productivity of work increased 50 times in comparison with former methods of work).

22. Engineer Burshtein and his colleagues designed an automatic line for the production of flat files. The equipment required for the production of this line was designed at ENIMS and built at various factories (MIZ - Moscow Tool Factory, and others). This line is already in operation at Serpukhov File Factory of the Ministry for Machine Tool Construction of the USSR. The half-finished material (Zagotovka) on this line is obtained from a belt on a rolling mill. The line carries out rolling, stamping, cutting, shaping, thermic treatment, grinding, notching of cogs (nasekaniye zubev) by an automatic knurling machine, hardening with high-frequency currents (the temperature of heating is automatically regulated by time by means of an electronic relay).

23. The Laboratory for Electrification of Machine Tools (LES ENIMS) is sometimes known as Laboratory for Electric Drives. It works out conditions which electric motors must satisfy, appliances for electric control, designs of magnetic plates, employment of asynchronic motors for driving machine tools, etc. In recent years the laboratory has worked out a stepless (Besstupenchaty) ionic electric drive for machine tools (ELIR) with electronic control, composed of a DC electric motor, an anode power transformer, a panel with thyratrons (type TER), electronic tubes, heat (nakal) transformer, condensers, potentiometers, etc. This electric drive is being employed successfully in new designs of Soviet machine tools.

24. The laboratory has worked out a very simple electric project for copying appliances which makes it possible to employ copying on many ordinary machine tools. It has also worked out a project for multispeed electric motors with small overall dimensions which are simple to produce. These electric motors have two, three, and four speeds. About fifteen types of such motors are now being produced at the Moscow Electric Pump Factory of the Ministry for Machine Tool Construction of the USSR,** and at other factories.

25. For the drives of internal grinders and diamond borers the laboratory has designed electric motors with a very high number of revolutions.

26. Before the war, this laboratory organized the production of electric appliances for machine tools at the Elektrostanok Factory at Kharkov, which was evacuated during the war to Tashkent and is now again working at Kharkov.

27. For a long time engineer V. I. Petrov was in charge of the laboratory. He has now been replaced by engineer V. G. Zusman, Candidate of Technical Sciences. Personnel includes engineers K. N. Soloviyev, V. B. Grinev, P. V. Markin.

28. The Laboratory for Hydraulic Driving Gears was organized as early as 1934. It carries out research on hydraulic machinery employed in machine tool construction. It designs standard hydraulic appliances, radial-piston and pinion pumps, and other devices. Before the war, it organized the production of hydraulic appliances at the Kharkov Gidroprivod Factory. After the war, it produced a universal hydraulic copying appliance which makes it possible to convert any universal lathe or milling machine into a semi-automatic copying machine for producing complicated shaped articles /double-coordinated hydraulic duplicator (profile copying attachment)/.

29. The laboratory has worked out a design for a single hydraulic control panel for drilling, boring, turning, and milling machines. The employment of these panels shortens the time required for production and reduces the cost of machine tools.

30. At the head of the laboratory is engineer G.I. Kamenetski, Candidate of Technical Sciences, Stalin Prize Laureate. His colleagues include I.Z. Zaichenko, Candidate of Technical Sciences, the designer of the hydraulic panel for grinding and honing work, and engineer K.P. Zanegin.

31. The Measuring Laboratory (sometimes called Control and Measuring Laboratory) carries out research on work connected with questions of complicated measurements, questions of precision machine tool construction, control of slot and gear joints, profilographs, and profilometers.

32. The Laboratory for Machine Tool Testing studies the design of machine tools of home and foreign make, examines defects and possibilities of improvement.

33. The Laboratory for Testing of Surfaces was recently organized. It studies physical-chemical properties of a surface under friction, wear and tear, lubrication, corrosion; it also studies properties of a surface in connection with the direction of machining lines (obrabotochniye riski). Professor A.I. Kashurin takes part in the work of this laboratory, as does L.B. Erlikh, Candidate of Technical Sciences.

34. Laboratories for Testing of Surfaces have now been organized in many scientific experimental institutes: for example, at the All-Union Scientific Research Institute of Tools of the Ministry for Machine Tool Construction (VNII MSS), at the Experimental Scientific Research Institute of the Bearings Industry (ENIIP), at the Central Scientific Research Institute of Heavy Engineering (TsNIITMASH), and at others. The ENIMS laboratory is in touch with similar laboratories of other Departments.

35. The Laboratory for Treatment of Plane Surfaces carries out research on questions connected with the treatment of plane surfaces and reaches practical solutions for industry. For example, this laboratory worked out the design for a high-speed two-pillar planing machine of type 7231A, an experimental model of which was built at the Stankokonstruktsiya factory and tested for a long time in the laboratory. Now these machines are being produced in series at the Voroshilov Machine Tool Factory at Minsk in two versions: with electric drive (speed of cutting up of 75 mpm) and with hydraulic drive. These machines possess great rigidity. The power of AC electric motor with Leonard drive is 48kw. Weight of machine: 18,150 kgs; maximum length of planing: 3,000 mm; maximum height of planing: 1,000 mm; maximum width of planing: 1,000 mm.

36. Another machine, a transverse planing machine of type 7A 36, with width of planing 700 mm has also passed tests in the laboratory and is now being built at the Kirov Machine Tool Factory of Gomel. It has a hydraulic drive with four speeds. Maximum speed of cutting: 40 mpm; power of electric motor of main drive: 11 kw; weight of machine: 3,480 kg. Regulation of speed is stageless from 3 to 40 mpm.

37. The laboratory has worked out the design of a high-speed bracketless vertical milling machine of type 6 A 54 for treatment of plane surfaces of steel and cast iron articles. A model of this machine was made at the Stankokonstruktsiya factory and after prolonged tests and alterations at the laboratory it was put into production at the Gorki Milling Machine Factory. Power of motor of this machine: about 50 kw; electric motor of main drive: 37 kw, with 40 to 1,250 rpm, enabling it to work at ordinary or high-speed regime; hydraulic shifting of gears. The operating process has been made automatic to a considerable degree. A worker inserts and removes the article under treatment.

38. The Laboratory for Automatic Lathe Work does research on questions connected with the work of automatic lathes, studies new experimental models of automatic lathes, and, after industrial tests, hands them over for serial production at machine tool factories. For example, the laboratory designed an automatic horizontal six-spindled hydroelectric lathe 1266 which can be re-adjusted in a very short time. The machine has a hydroelectric control plan, a lubricant control relay, a time relay, pressure relay, etc. When this machine was designed the principle of automatization in a universal machine was taken into consideration. The head of the laboratory is the well-known designer engineer A.B. Okhlyand, Cand. Tech. Sc.

39. The Laboratory for Grinding and Finishing Work studies questions connected with grinding on grinding machines. It has designed several types of bearings for the spindles of internal grinding machines and diamond boring machines, operating with a maximum of 40,000 rpm and ensuring the smooth running of the spindle.

40. The laboratory has designed a cylinder-and-cone grinding machine type 316 E with stageless electronic drive (ELIR) for the smooth alteration of the number of revolutions of an article. This machine has an automatic grinding head. The principle of automatization in a universal machine was taken into account in this design also. The head of the laboratory is designer-engineer B.T. Breyev.

41. The Mechanical Laboratory studies diverse questions, including the design of a mechanized drive. A design has been worked out for a stageless mechanical regulator which is considerably superior to the regulator of Svetozarov's system. The latter, in spite of prolonged work on its improvement, has proved to be hardly suitable in industrial conditions.

42. The Laboratory for Testing Experimental Models in connection with the Planning of Standards and Departmental Norms is the laboratory of the Bureau for Normalization and Standardization and is reserved for testing appliances, mechanical devices, and parts which are designated to become norms in machine tool construction. Of the recent work of this laboratory and bureau, attention may be drawn to the work published by ENIMS and entitled, "Standards for the Arrangement of Lubrication", which embraces all lubricating devices, arrangements for the control of the flow of oil, and all parts for the assembling and installation of an oil conduit. Other recent publications include standards for pneumatic devices of machine tools, standards for cleanness of surfaces of basic parts of machine tools (the latter first came into use at the Stankokonstruktsiya factory [redacted] and will later be introduced at other machine tool factories). Standards for slot connections, friction clutches, allowances for gear connections, etc., are now being worked out. 50X1-HUM

43. The basic task of ENIMS [redacted] has been the working out of methods of work of machine tools at high-speed regimes with employment of hard alloy tools, the creation of new designs of machines for high-speed cutting of metal, and the automatization of machine tools. 50X1-HUM

44. Re-equipment of the machine tool stock is planned and is taking place throughout the whole of industry in USSR. But this re-equipment is proceeding slowly because of the shortage of new designs for machine tools. Consequently the Ministry for Machine Tool Construction set ENIMS the urgent task of modernizing existing machine tools to enable them to operate at high-speed regimes.

45. The utilization of the enormous stock of existing machine tools for purposes of high-speed treatment has been fixed as a most important task, as the modernization of machine tools involves a minimum expenditure of time.

46. ENIMS has already accomplished a great deal towards the modernization of machine tools. This work has been accomplished by workers of ENIMS not only in the laboratories and at the Stankokonstruktsiya factory, but also in conjunction with designers from machine tool factories to which workers of ENIMS were attached.

47. Several types of machine tools modernized by ENIMS and now being produced in series are quoted below as examples. In general, modernization has consisted of a change in the number of revolutions of the spindle, an increase of the power of the electric motor, and slight changes in the design of the machine tool, mainly in order to increase the rigidity.

a. Turret lathe of type 1 M 36 (imeni Ordzhonikidze factory), with number of revolutions of spindle up to 750 pm and with power of main drive 7.2kw, was modernized by ENIMS in collaboration with the designers of the imeni Ordzhonikidze Machine Tool Factory, where this machine tool was produced. In the modernized machine tool the number of revolutions of the spindle reaches 1,000 rpm (45-1,000), the power of the main drive is 10kw, and the rigidity of the machine has been increased by means of simple modifications.

b. Machine tool type I A 36 (Factory i/n Ordzhonikidze) has likewise been changed. The number of revolutions of the spindle has been raised to 730 pm and the power of the electric motor to 10kw. Smooth pulleys have been replaced by V-belt (klinoremenny) pulleys of another diameter.

c. Turret lathe type 1336 (produced at the Machine Tool Factory i/n Gorki at Svyatoshino, near Kiev): number of revolutions of spindle increased from 1,160 to 2,100 pm, power of electric motor from 3.8kw to 5.8kw.

d. Turret lathe type 1325, produced by Alapayevsk Machine Tool Factory: number of revolutions of spindle increased from 1380 to 2480 pm; power of electric motor from 2.2 to 3.2kw. The gearbox has been modified. The flatbelt transmission has been changed to V-belt transmission; slide bearings on the spindle have been replaced by roller bearings.

e. Screwcutting lathe of type 1 D 63 of the Machine Tool Factory i/n Kirov at Tbilisi has been modernized by ENIMS and is produced in series at Tbilisi under the designation DIP-30 A. Number of revolutions of spindle increased from 448 to 750 pm, power of motor from 7.8 to 10kw. Flatbelt pulleys have been replaced by V-belt pulleys.

f. Screwcutting lathe type 1 D 62 M of the Krasny Proletari factory has been modernized by ENIMS and designers of the factory. Number of revolutions of spindle increased from 600 to 1200 pm, power of electric motor from 4.3 to 7.8kw, and in some lathes to 10kw.

g. Vertical drilling machine type 2135 of Machine Tool Factory i/n Lenins a two-speed electric motor has been installed to facilitate the use of the machine for work with high-speed cutting and hard alloy tools for holes with diameters from 16 to 35mm.

h. Vertical drilling machine type 2125. Power increased from 2.2 to 3.2kw. Number of revolutions of spindle has been changed.

i. Bracket-milling machines types 682 and 633. Power of first machine increased from 3.7 to 5.8kw and of second from 7.8 to 12kw. Number of revolutions of spindle increased to 630 pm.

j. Plano-milling machine type 6 G 55. Power increased to 13kw.

k. Horizontal boring machine type 262-G. Number of revolutions increased from (20-750) to 1,000 pm, power of motor from 4.5 to 7.2kw.

48. At the present time the following modernized machine tools are being produced:

a. Turret lathes: 1 A 36, 1 M 36, 1336, and 1325***

b. Screwcutting lathes: 1 D 62, 1 D 62 M, 162 K, 1 D 63, 1615, and 162 SP

c. Plano-milling machines: 6 G 55, 6 G 65

d. Bracket-milling machines: 1612, 6 B 82, 682, 633, 615, 6 B 12, and 6 B 82 G

e. Vertical drilling machines: 2125 and 2135

f. Horizontal boring machines: 262 G

Personnel

49. Personnel of ENIMS consists of about 130 scientific workers. The director is A.P. Vladziyevski, Cand. Tech. Sc.; deputy director is engineer I.G. Klimenko; chief engineer is A.E. Prokopovich; chief designer is Professor V.I. Dikushin*, Dr. Tech. Sc., Corresponding Member of Academy of Sciences.

50. Below is a list of some of the scientific workers of ENIMS. Some of these workers, e.g., Professors N.S. Acherkan and B.S. Balakshin and others, do not belong to ENIMS, but collaborate with it.

Professor N.S. Acherkan, Dr. Tech. Sc.
Professor B.S. Balakshin, Dr. Tech. Sc.
Professor B.I. Boguslavski, Dr. Tech. Sc.
Professor A.S. Britkin, Dr. Tech. Sc.
Professor V.I. Dikushin, Dr. Tech. Sc., Chief Designer, C.M. Acad. Sc.
Professor L.I. Fantalov
Professor A.I. Kashirin, Dr. Tech. Sc.
Professor D.N. Reshetov, Dr. Tech. Sc.
Professor G.A. Shaumyan, Dr. Tech. Sc.
Professor A.K. Zaitsev, Dr. Tech. Sc.

Avksentiyev, I.G.	Cand. Tech. Sc., head of Bureau for Guiding Materials
Barbashov, F.A.	Cand. Tech. Sc.
Chikhachev, S.A.	Cand. Tech. Sc.
Enikeyev, Kh.M.	Cand. Tech. Sc.
Erlikh, L.B.	Cand. Tech. Sc., lecturer
Kamenetski, G.I.	Cand. Tech. Sc., head of an ENIMS laboratory

Kedrov, S.M.	Cand. Tech. Sc.
Kogan, E.S.	Cand. Tech. Sc.
Lapidus, A.S.	Cand. Tech. Sc.
Lashchaver, A.L.	Cand. Tech. Sc.
Niberg, N. Ya.	Cand. Tech. Sc.
Okhlyand, A.B.	Cand. Tech. Sc.
Rozenberg, Yu.A.	Cand. Tech. Sc.
Sak-Shak, B.A.	Cand. Tech. Sc.
Spivak, E.D.	Cand. Tech. Sc.
Sum-Shik, M.R.	Cand. Tech. Sc.
Vladzivevski, A.P.	Cand. Tech. Sc., Director of ENIMS
Yakobson, M.O.	Cand. Tech. Sc.
Zaichenko, I.Z.	Cand. Tech. Sc.
Zusman, V.G.	Cand. Tech. Sc.
Alekseyev, E.G.	Engineer
Ambarov, V.A.	Engineer
Barbashin, N.N.	Engineer (Moscow Higher Technical School)
Breyev, B.T.	Engineer, head of an ENIMS laboratory
Chernikov, S.S.	Engineer
Davydovski, A.S.	Engineer, head of laboratory for Machine Tool Architecture and Modelling
Diyachenko, P.E.	Engineer
Filatov, B.L.	Engineer
Florensova, F.R.	Engineer
Gleizer, L.A.	Engineer
Gradusov, N.M.	Engineer
Kharitonov, A.M.	Engineer
Kovan, V.M.	Engineer, professor of Moscow Higher Technical School - MVTU
Markin, P.V.	Engineer
Mazyrin, I.V.	Engineer
Morozova, E.M.	Engineer
Penkov, P.M.	Engineer
Prokopovich, A.E.	Engineer, Chief engineer of ENIMS
Rogovin, L.D.	Engineer
Skidalski, M.M.	Engineer
Stepanov, Yu. I.	Engineer

II. Stankokonstruktsiya Machine Tool Factory

Identification

51. The Stankokonstruktsiya Machine Tool Factory (Stankostroitelny Zavod - Stankokonstruktsiya) is located in Moscow, Leninski Raion, 21b, 5-i Donskoi Proezd.

History

52. Stankokonstruktsiya was founded at the Experimental Scientific Research Institute for Metal-cutting Machine Tools (ENIMS) in 1934. At first the factory employed only 200 workers. Gradually, as ENIMS developed, its experimental factory developed also. From the date of its establishment to June 1941 (outbreak of war) the factory produced about 650 machine tools of various types. It did not build machine tools in series but only produced new machine tools of universal, special, and aggregate types. Before the war, the factory had already begun to specialize in the production of aggregate machine tools. After the war, the factory was awarded the Order of Lenin for its work during the war and began to be known as the Order of Lenin Stankokonstruktsiya Factory.

Wartime Production

53. Listed below are some of the special aggregate machine tools designed for the defense industry by ENIMS during the war and built mainly at the Stankokonstruktsiya Factory:

a. High-power horizontal broaching lathe type 759 for barrels of heavy and medium guns - length about 12m. These machines greatly increased the output of guns. The first model was produced in 1942.

b. 84-spindle vertical boring machine for gun-carriage cradles, type 4 M 29.

c. Precision aggregate machine tool B-44 for boring three holes in aero-engine gear-cases (it was very difficult to attain the required precision for these boring operations on universal machine tools). Three spindle heads were placed at angles corresponding to the spacing of the holes in the part under treatment. Number of revolutions of machine: 2500 rpm.

d. Semi-automatic lathe type 132 for machining flanges of aero-engine crankshafts.

e. Multiple-spindle aggregate machine tool B-34 for rough and finishing boring of bodies of fuel pumps of tank Diesel engines.

f. Aggregate machine tool type B-08 for boring bearings for distributing rollers for engine heads. The spindles are driven by hydraulic motors. The B-45 machine tool for the aircraft industry (aircraft-engines) was a similar tool. Precision up to 15 microns.

g. Vertical 4-spindle aggregate machine tool of type B-01 for rough boring of ordnance breeches and engine bushes.

h. Semi-automatic vertical 8-spindle machine type 4 M 23 with hydraulic feed for deep drilling of bores of rifle and machine-gun barrels. Drilling is done from below upwards by a stepped method.

i. Aggregate machine tool of type B-89 for boring holes in the main journals of engine crankshafts. Treats two crankshafts simultaneously.

j. 36-spindle boring machine type B-40 for finishing treatment of valve seats in monoblocks of aircraft-engines, etc.

The factory also built three automatic machine tool lines for treatment of large tank parts.

Post-War Production

54. After the war, in accordance with a Five Year Plan compiled by the Ministry for Machine Tool Construction, the factory became a specialized enterprise for the production of aggregate machine tools and automatic machine tool lines. According to this plan, in each of the five years the factory must produce 300 aggregate machine tools of various types and must also execute new designs of machine tools of various types worked out by ENIMS laboratories. The aggregate machine tools must be built according to projects worked out by Special Design Bureau No. 1 of the Ministry of Machine Tool Construction of the USSR.

55. Special Design Bureau No. 1 was formed by reorganizing the Central Design Bureau for Aggregate Machine Tools (TsKBAS) of ENIMS (see Part I, para 10 above). The task of the new bureau is to design special and aggregate machine tools and automatic lines, shops, and factories. Another factory specialized in the construction of aggregate machine tools and automatic lines is Machine Tool Factory i/n Ordzhonikidze.

56. Since the war, the Stankokonstruktsiya factory has built more than 15 automatic lines and a large number of aggregate machine tools in addition to a small number of machine tools of new designs worked out by ENIMS laboratories. Most of these automatic lines were built for the automobile, tractor, electrical, and transport industries (tank production is at present included in the transport industry). Description of the automatic lines follows:

a. The first automatic line of machine tools built after the war was for the Kharkov Tractor Works. The line was completed at the beginning of 1946. For a clearer picture of this line, details are given below. The line is now treating cylinder heads for engines of STZ-NATI tractors at Kharkov Tractor Works. The line consists of 14 aggregate machine tools numbered from A 241 to A 254 inclusive. Twenty electric motors with a total power of 122kw are working on this line. The number of spindles working simultaneously is 134. The part treated measures 800 x 250 x 145mm. The total number of electric appliances (switches, relays, etc.) is 341. Total length of electric wiring is about 15km. The line has a light signalling system which indicates the work of individual machine tools and the conveyor and which determines in the event of interruptions which machine tools caused the dislocation of work. The total time required for the treatment of one part is 3.5 minutes (17 parts per hr.).

1) Below is a list of the machine tools composing the line and a summary of the work executed by each tool:

A 241 - nine-spindled horizontal boring machine; carries out finishing boring of compression chambers.

A 243 - thirty-spindled horizontal drilling machine. Completes drilling of oil conduit to a depth of 134mm., removes edges in 8 valve holes, drills to a half of the depth 13 holes with a diameter of 18mm. for pins passing through the whole head, and 8 holes for other pins.

A 244 - twenty-two spindled horizontal drilling machine. Drills one hole with diameter of 18mm. to depth of 25mm., and 8 holes with diameter of 18mm. for pins.

A 245 - seventeen-spindled drilling machine. Drills 6 holes with diameter of 8.4mm to depth of 25mm; 4 holes with diameter of 10.2mm to depth of 30mm; faces 4 holes for plugs with diameter of 40mm. to depth of 5mm (on upper plane surface); on side plane surface drills 3 holes with diameter of 10.2mm to depth of 25mm.

A 246 - eight-spindled horizontal boring machine. Bores 8 valve holes with combined tools.

A 247 - thirteen-spindled thread-cutting machine. On upper plane surface threads 4 holes of one size, 6 holes of another size, and on the side plane surface threads 3 holes.

A 248 - eight-spindled horizontal boring machine . Reams eight valve holes.

A 249 - four-spindled inclined drilling machine. Bores 4 holes for sparking plugs.

A 250 - seven-spindled horizontal drilling and boring machine. Drills 4 holes with diameter of 11.7mm to depth of 34mm, bores 2 holes with diameter of 54.6mm and drills one hole with diameter of 8.4mm to depth of 66mm.

A 251 - four-spindled inclined threading machine. Cuts thread in 4 holes for sparking plugs.

A 252 - two-spindled horizontal boring machine. Reams 2 holes.

A 253 - one-spindled vertical milling machine. Does finishing milling of lower plane surface of heads.

A 254 - five-spindled horizontal threading machine. Threads five holes.

2) All these machines are in pairs, one facing the other; for example, A 241 stands opposite A 242. Each pair of machines treats simultaneously one and the same part from two sides. Between the fourth and fifth pair there is a device for giving the part a turn of 90 degrees. Transport of parts on the line is effected by a special appliance which, on completion of the cycle of work, ensures the gripping and shifting of the article to the next working position.

3) All appliances are operated from a hydraulic gripping station (rotary pump with an output of 26 liters pm and hydraulic panel).

4) The line has three kinds of control: automatic, semi-automatic, and adjusting (naladochny).

5) Filings are removed by a special device passing along the whole line under floor-level.

b. Another automatic line is the line of machine tools A 261 to A 268 for the treatment of the cylinder block of the engine of ZIS-150 truck of the Moscow Automobile Factory i/n Stalin. Three other automatic lines for the treatment of this part were built at the Factory i/n Ordzhonikidze of the Ministry for Machine Tool Construction. This line has 8 machines, 57 cutting tools, 127 electric appliances (not counting motors), 50 hydraulic appliances (excluding cylinders). This line, and the three lines built at the Ordzhonikidze Factory, are still operating at the ZIS Factory in difficult conditions, in three shifts, and have been for nearly four years.

1) At first there were numerous hitches with the electric and hydraulic appliances, but gradually they were eliminated. Stoppages were due to defects of machinery (e.g., roller bearings out of order, insufficient lubrication of bearings, wearing out of drive gears). These defects were eliminated and do not occur in new lines. Stoppages continue on account of the tools (normal wear and tear and accidental breakages). There was considerable breakage of screw taps on account of filings. Now quick-gripping tool chucks have been introduced and other measures are also being taken.

2) Most of the stoppages are the result of organizational troubles, tools, hydraulic appliances, electric apparatus, and mechanical parts, in that order. Nevertheless, in the course of four years, this line has ensured the required output of engine blocks. There have never been delays because of the blocks.

c. Another automatic line of machine tools is for treatment of small cylinder blocks of the light car of the Moscow Light Car Works (Zavod Malolitrazhnykh Avtomobilei). This has 13 machines, 181 tools. Total power of electric motors is 62kw. Productivity: one article in 2 minutes (30 per hr.)

d. Another automatic line of machine tools is for treatment of the block heads of tractor engines. This line has 33 machine tools with 265 tools working. Sixty-four electric motors. Total power: 258kw. Length of line: 42.5 meters. Complete automatization of auxiliary operations for supply, fixing and tightening of articles under treatment. This line has been produced for the Minsk Tractor Works. Its installations took 25 days and adjusting another 7 days, whereas the installation of the first line after the war took 2 months and adjusting a further 15 days. The line treats 18 articles per hour.

e. Automatic line of machine tools for the Moscow Light Car Factory. Six machine tools.

f. Automatic line for Gorki Automobile Works i/n Molotov.

g. Automatic line for the treatment of blocks of automobile engines of the Yaroslavl Automobile Works.

h. Automatic line for the treatment of engine heads of Yaroslavl Automobile Works.

Note: - Lines for the Yaroslavl Automobile Works were an improvement on earlier ones: special devices for safeguarding tools from breakage, improved light signal system for control of work, devices for measuring articles during treatment, etc.

i. Automatic line of machine tools for treatment of electric motor shafts. Treats shafts of various dimensions. Switch from one size to another is effected by changing certain devices for holding the shafts, re-adjusting the cutting tools, and changing the number of revolutions and the feed on the machine tools.

j. Automatic line of machine tools for treatment of ZIS gear-boxes.

k. Automatic line of machine tools for treatment of YaAZ (Yaroslavl Automobile Works) gear-boxes.

l. Automatic line for complete treatment of Diesel block heads. Machine tools: A 849, A 850, 851, 852, 853, 854, etc.

m. Automatic line of machine tools for treatment of parts of Diesel engines for the Chelyabinsk Works i/n Kirov.

n. Automatic shop for the production of piston rings. Complete production is automatic.

o. Automatic shop for the production of piston cams. Complete production is automatic.

p. Automatic factory for the mass production of automobile pistons. Complete automatization of all operations: casting, machining, finishing, and packing. This factory is already in operation but has certain defects which are gradually being eliminated. It is estimated that the factory will be handed over for industrial work [redacted]

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q. Machine tool lines are planned for the production of crankshafts, camshafts, gears, and flanges.

57. The Stankokonstruktsiya Factory also produces a large number of different individual aggregate machine tools for various industries: automobile and tractor, transport, aircraft, armaments, etc. For example, aggregate machine tool A 819 for milling front axles of trucks; aggregate machine tool A 888 with eight spindles (weight: 9 tons) for locomotives.

58. A characteristic of aggregate machine tools of recent design is that, whereas formerly aggregate machine tools were built for the treatment of holes (drilling and boring), now they carry out milling, grinding, and turning operations. A project is now being studied for the design of a machine tool which will combine diverse operations for the treatment of rotating and plane surface articles (tela vrashcheniya i ploskostei).

59. The time taken to design and build aggregate machine tools has been reduced by the employment of the "aggregating" method, that is, the utilization of previously designed standardized parts and machinery when working out the drawings, and the building of a machine tool from a number of standardized units and parts.

60. The factory also has a shop for the production of automatic power heads for aggregate machine tools. Hydraulic heads of the following types are produced: from 2 to 5HP; from 5 to 7.5HP; from 10 to 15HP; from 20 to 30HP.

Personnel

61. Before the war there were about 2500 workers in the entire factory; in March 1950 there were about 2800. These are divided into three shifts: day and evening shifts of about 1,000 workers each, and night shift of about 800.

62. Following are the names of some of the top personnel:

a. Director: M.M. Chuyan

b. Chief engineer: I.I. Kozlov

c. Chief Technologist: S.P. Zolotarev

d. Chief of Assembly Shop: P.G. Matveyev

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*** [redacted] Comment: Since the number 3 and the letter Z are identical in Russian; it is possible that types 1336 and 1325 should read 1 Z 36 and 1 Z 25.